

Analog and Power Microelectronics to Higher Radiation Levels and Lower Temperatures

Completed Technology Project (2012 - 2013)



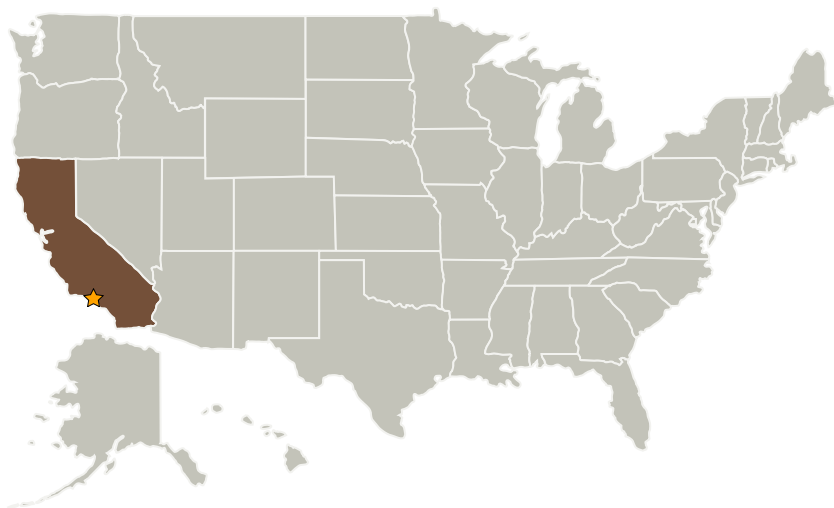
Project Introduction

A study was done to examine low-temperature effects and radiation damage properties of bipolar integrated circuits. Anticipated benefits: useful in missions with electronics that operate at low temperature. This task developed analytical methods for low temperature performance. Bandgap narrowing was shown to be the underlying reason for the large decrease in npn transistor gain at low temperature. Furthermore, we have developed analytical methods for radiation damage in combination with low temperature. This model reproduces our experimental results of temperature dependent radiation damage yields. This work has shown that operating bipolar circuits at reduced temperature can improve radiation tolerance.

Anticipated Benefits

Useful in missions with electronics that operate at low temperature.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California



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Primary U.S. Work Locations

California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

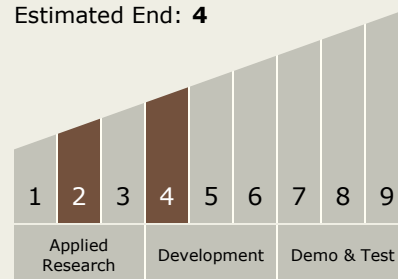
Jonas Zmuidzinis

Principal Investigator:

Allan H Johnston

Technology Maturity (TRL)

Start: **2**
Estimated End: **4**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.3 Avionics Tools, Models, and Analysis
 - └ TX02.3.2 Space Radiation Analysis and Modeling